



## Persistence of cardiovascular risk factors in patients with coronary artery diseases after percutaneous coronary interventions

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### Abstract

**Introduction:** Coronary artery disease (CAD) is as a leading cause of death and disability all around the world. Multiple risk factors have a role in the development and progression of coronary heart disease (CHD). It is necessary to control risk factors, to achieve optimal results of treatment. The aim of present study was to evaluate the persistence of cardiovascular risk factors in patients with CADs after percutaneous cardiac interventions.

**Methods:** In an analytical-descriptive study, 150 patient with CAD and percutaneous coronary intervention (PCI) were performed for them, and referred to Cardiology Clinic of Shahid Madani Hospital of Tabriz University of Medical Sciences, Tabriz, Iran, from September 2013 to September 2015, were studied. The persistence of coronary risk factors, 12-24 months after performing PCI, was evaluated.

**Results:** The mean age of patients at time of PCI performing was  $57.90 \pm 12.26$  years. 72.7% of patients were male and 27.3% were female and male to female ratio was 1 to 0.37. Dyslipidemia in 52.0% of patients, hypertension in 51.3% patients, and diabetes mellitus (DM) in 41.3% patients were the most common underlying comorbidities. In both before and after doing PCI, 26.7% were a smoker, and smoking rates after doing PCI also showed no significant change ( $P = 0.055$ ), and also there were no significant changes in the physical activity of patients compared before and after performing PCI.

**Conclusion:** Based on the findings of the present study, dyslipidemia, hypertension, and DM, was the most frequent underlying diseases in patients with CAD respectively. Risk factors such as smoking, and lack of exercise, had no significant changes after performing PCI.

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### Introduction

Coronary artery disease (CAD) is as a leading cause of death and disability in all around the world.<sup>1</sup> The mean prevalence of CAD is estimated to be 6.9% in men and 6.0% in women.<sup>2</sup> Also in Iran, cardiovascular disease (CVD) and CAD is one of the major causes of death and disability, and it is responsible for

more than half of deaths.<sup>3,4</sup> CAD, in addition, to has a special role in mortality is one of the major causes of morbidity in patients and due to disability particularly in workforce of communities, also impose heavy costs on the healthcare system of the countries.<sup>5,6</sup> CAD and other chronic diseases are in need of appropriate control and treatment, otherwise,

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they have many direct and indirect costs to the health care system. According to the estimation of insurance, indirect costs of CAD patients is multiplied of the direct cost of disease.<sup>5,7</sup>

Multiple risk factors are involved in the development and progression of CAD. In general, risk factors of CVD and CAD can be divided into two groups. The first group is non-adjusted risk factors such as age, sex, race, and family history. The second group is adjustable risk factors such as hypertension, diabetes mellitus (DM), dyslipidemia, overweight, and smoking.<sup>4,8</sup> Several studies have demonstrated that the prevalence of risk factors in patients with CAD is very high and most of the risk factors related to smoking and high blood pressure. It is also very important that 96% of CAD patients had, at least, one adjustable risk factor.<sup>9</sup>

Percutaneous coronary intervention (PCI) is one of the methods of diagnosis and treatment of CAD patients, and it is used widely today. Studies have suggested that CAD patients after coronary artery bypass graft (CABG) or PCI, not follow the treatment recommendations and they do not modify their risk factors.<sup>10,11</sup> Considering the importance of reducing risk factors to achieve optimum results in the treatment of CAD patients, the aim of this study was to evaluate the persistence of cardiovascular risk factors in patients with CAD after performing PCI.

## Methods

In a descriptive-analytical study from September 2013 to September 2015, we studied 150 CAD patients and investigated them in 12-24 months after undergoing PCI. Patients were selected randomly using software Rand List (version of 1.2) among patients who came to Shahid Madani Educational Centre of Tabriz University of Medical Sciences, Tabriz, Iran (which is a referral center for cardiology in the North West of Iran).

Inclusion criteria were all patients with CAD disease, and PCI was performed for them. Exclusion criteria were collagen vascular

disease (lupus erythematosus, rheumatoid arthritis, etc.), chronic renal failure, malignancies, and chemotherapy or radiation therapy, treatment with glucocorticoids, heart rhythm disorders, patients with implantable cardioverter defibrillator (ICD), and unwillingness of patients to participate in the study or continue that.

With consideration of inclusion and exclusion criteria, 150 CAD patients were evaluated. Patients' demographic information, past medical histories, adjustable risk factors before performing PCI and 12-24 months after that, were collected.

For performing statistical analysis, implemented software program was SPSS (version 16, SPSS Inc., Chicago, IL, USA). Collected information has been presented as the mean  $\pm$  standard deviation (SD) and also as frequency and percentage. Student's t-test was used to compare quantitative variables and for chi-square (Fischer exact test if needed) was used to compare qualitative variables. In all cases of present study, results were statistically considered as significant with  $P \leq 0.050$ .

In term of research and medical ethics, the protocol of the present study was approved by the Ethics Committee of Tabriz University of Medical Sciences which follows Declaration of Helsinki.

## Results

At the time of PCI performing, the mean age of patients was  $57.90 \pm 12.26$  years. From 150 patients, 109 patients (72.7%) were male, and 41 patients (27.3%) were female. Male to female ratio was 1 to 0.37. In time of PCI performing, mean age of males was  $57.82 \pm 12.42$  years and mean age of females was  $58.09 \pm 11.96$  years. There was no significant difference between men and women in the age of PCI performing ( $P = 0.904$ ).

In term of comorbidities in patient at the time of PCI performing, dyslipidemia were in 78 patients (52.0%) and dyslipidemia was the most common underlying medical disease. Hypertension in 77 patients (51.3%), DM in 62 patients (41.3%), renal disease in 26

patients (17.3%), thyroid disease in 5 patients (3.3%), and liver disease in 4 patients (2.7%) were the other underlying medical conditions in order of frequency.

In terms of cigarette smoking in the time of PCI performing, 40 patients (26.7%) were smokers with a mean of  $21.45 \pm 5.56$  cigarettes a day. After 12-24 months from PCI performing, again 40 patients (26.7%) were smokers with a mean of  $20.60 \pm 6.40$  cigarettes a day. There was no significant difference in mean of cigarettes consumption before PCI performing with 12-24 months after PCI performing ( $P = 0.055$ ).

In terms of patients' body mass index (BMI), mean of patients' BMI in PCI time was  $27.79 \pm 3.62$  and after 12-24 months from PCI performing was  $27.09 \pm 3.24$ . There was a significant difference in mean of BMI before PCI performing with 12-24 months after PCI performing ( $P = 0.001$ ).

The mean systolic blood pressure (SBP) of patients before PCI was  $129.50 \pm 22.80$  mmHg and 12-24 months after PCI was  $126.17 \pm 21.31$  mmHg. Decreases of patients' mean SBP was statistically significant ( $P = 0.020$ ). The mean diastolic blood pressure (DBP) of patients before PCI was  $76.74 \pm 10.29$  mmHg and 12-24 months after PCI was  $78.29 \pm 10.87$  mmHg. There was no significant difference in mean of DBP of patients, before PCI performing with 12-24 months after PCI performing ( $P = 0.080$ ).

Patients' lipid profile before and after performing PCI was according to table 1.

Before performing PCI, 67 patients (44.7%) had no any type of physical activity and 12-24 months after PCI, 53 patients (35.3%) had no any type of physical activity again. The mean physical activity of patients who had a type of physical activity in a week

before performing PCI was  $2.03 \pm 0.33$  hours per week and mean physical activity of patients who had a type of physical activity in a week after PCI was  $2.22 \pm 0.24$  hours a week. There was no significant difference in mean of physical activity before PCI performing comparing with 12-24 months after PCI performing ( $P = 0.153$ ). Finally, there were no any new cardiac events during this study.

### Discussion

CVD and CAD always is one of the major causes of morbidity, and according to the World Health Organization (WHO) report, CVD is the first leading cause of death all around the world.<sup>12</sup> In developed countries, CVD cause 1.4 million deaths annually, and also 5.7 million deaths occurs in developing countries because of CVD.<sup>13</sup> The prevalence of these diseases and CAD during the past decades had a great increase. However, the risk factors, prevalence, and mortality of these diseases are controllable and preventable.<sup>14,15</sup> Risk factors of CAD that increase mortality rate and morbidity, including age, weight, abdominal obesity, cigarette smoking, inactivity, high blood pressure, dyslipidemia, coagulation disorders, and resistance to insulin. Many of these risk factors are controllable.<sup>16,17</sup>

In the present study, we investigated the persistence of some common cardiovascular risk factors in patients with CAD after PCI performing. Patients were studied in time of PCI performing and the next time of evaluation was 12-24 months after PCI performing. Dyslipidemia in 52.0% of patients was the most common comorbidity in patients. Hypertension in 51.3% of patients, DM in 41.3% of patients, and renal

**Table 1.** Patients' lipid profile before and after performing percutaneous coronary intervention

Lipid file	Time		P
	In time of PCI	12-24 months after PCI	
Cholesterol (mg/dl)	$161.13 \pm 62.21$	$155.03 \pm 50.09$	$P = 0.009$
TG (mg/dl)	$186.03 \pm 62.83$	$182.10 \pm 55.17$	$P = 0.173$
LDL (mg/dl)	$101.82 \pm 40.36$	$97.64 \pm 36.91$	$P = 0.007$
HDL (mg/dl)	$36.12 \pm 10.66$	$39.46 \pm 9.72$	$P = 0.144$

LDL: Low-density lipoprotein; HDL: High-density lipoprotein; PCI: Percutaneous coronary intervention; TG: Triglyceride

disease in 17.3% of patients were the next common underlying disease in this study. All patients who were smoke before PCI, they were smoke again after performing PCI, and also there was no significant changes in the amount of cigarette smoking in these patients ( $P = 0.055$ ). Although, there was a statistically significant change in patients' mean BMI ( $P = 0.001$ ), but this change was a slightly decline ( $27.79 \pm 3.62$  vs.  $27.09 \pm 3.24$ ). There was a slightly decline in mean SBP of patients and this was statistically significant ( $P = 0.020$ ), but DBP had no statistically significant changes ( $P = 0.080$ ). Generally, changes in BMI and SBP of patients before and after performing PCI had not significant clinically value.

In term of physical activity, 12-24 months after performing PCI, 35.3% of patients had no any type of physical activity in a week. There was no statistically significant change in mean time of physical activity in patients who had a kind of physical activity in a week ( $P = 0.153$ ). In term of patients' lipid profile, there were statistically significant changes in cholesterol ( $P = 0.009$ ) and in low-density lipoprotein (LDL) ( $P = 0.007$ ), but changes in triglyceride (TG) ( $P = 0.173$ ) and high-density lipoprotein (HDL) ( $P = 0.144$ ) were not statistically significant.

In a large multicenter study in 22 countries in Europe, lifestyle, risk factor and therapeutic management of patients with coronary heart disease (CHD) were studied. Based on findings of this study, 17.0% of patients smoked cigarettes, 35.0% were obese, and 53.0% were centrally obese. This investigation demonstrated that large proportions of CAD patients do not achieve the lifestyle, risk factor and therapeutic targets for CVD prevention.<sup>18</sup> Similar to Europe study, in our study there were no clinically significant changes in lifestyle or risk factors of CAD patients after performing PCI.

In another study, smoking habits of European patients with CAD after action on secondary prevention through intervention was investigated. Based on results of this

study, 21.0% of patients who were smoke before were persistent smokers. This study suggested that prevalence of smoking in European patients with CAD is too high, and there is a need for the development of effective smoking cessation programs.<sup>19</sup> In our study, 40.0% of patients were smokers and all of them were persistent smokers in 12-24 months after performing PCI. Based on this result, we need more effective smoking cessation programs to prevent of CAD patients from smoking habit.

Finally all available studies in the field, suggest that it is very important to control and decrease cardiovascular risk factors in CAD patients, and also studies demonstrate that risk factors control programs are not very effective, and they need to be reviewed.

#### *Limitations*

Cardiovascular risk factors are numerous, and we need plenty of time to evaluate the persistence of all in CAD patients. We recommend conduct similar study in other educational centers.

#### **Conclusion**

Based on the findings of the present study, the most of cardiovascular risk factors in CAD patients of our region in 1-2 years after PCI performing do not change significantly. Dyslipidemia, hypertension, and DM, was the most frequent underlying diseases in patients with CAD, respectively.

#### **Conflict of Interests**

Authors have no conflict of interest.

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